DEVELOPING COMMERCIAL SOFTWARE
Product vs. Technology

• Technology is written for the sake of the technology
  – Research
  – Prototyping
  – Platform Development

• Product is written to be sold
  – Has an identified market
  – Output is something which can be sold
The Commercial Software Team

The SQL Response 2.0 Project Team

<table>
<thead>
<tr>
<th>#</th>
<th>Role</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Scrum Master/Project Manager</td>
<td>Scrum master, coordinates backlog.</td>
</tr>
<tr>
<td>1</td>
<td>Product Manager/Owner</td>
<td>Commercial input. Represents users.</td>
</tr>
<tr>
<td>1</td>
<td>Usability Engineer</td>
<td>Designs visual aspects of product.</td>
</tr>
<tr>
<td>1</td>
<td>Technical Author</td>
<td>Responsible for all text in the product.</td>
</tr>
<tr>
<td>5</td>
<td>Software Engineers</td>
<td>Architect and develop the software</td>
</tr>
<tr>
<td>4</td>
<td>Software Testers</td>
<td>Ensure the software complies with user stories</td>
</tr>
</tbody>
</table>

This is just one team within Red Gate but the ratios are fairly standard. As product and project needs change we will vary the number of people and ratios.
## Stages of a Project

<table>
<thead>
<tr>
<th>Stage</th>
<th>Length</th>
<th>Output</th>
<th>People Involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Phase</td>
<td>1 month – 5+ years</td>
<td>Business case approval</td>
<td>PM, UX</td>
</tr>
<tr>
<td>Pre-greenlight</td>
<td>2 weeks – 2 months</td>
<td>Project Approval</td>
<td>PM, SM, UX, Dev</td>
</tr>
<tr>
<td>Greenlight</td>
<td>1-4 weeks</td>
<td>Backlog</td>
<td>SM, PM, UX, Dev, Test</td>
</tr>
<tr>
<td>Pre-EA</td>
<td>n Sprints</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; EA Build</td>
<td>SM, Dev, UX, Test, PM</td>
</tr>
<tr>
<td>EA Program</td>
<td>m Sprints</td>
<td>m EA Builds</td>
<td>SM, Dev, UX, Test, PM</td>
</tr>
<tr>
<td>Beta</td>
<td>4-8 weeks</td>
<td>Release Candidate 1</td>
<td>SM, Test, Dev, UX</td>
</tr>
<tr>
<td>Release Candidate</td>
<td>2-4 weeks</td>
<td>Release Build</td>
<td>SM, Test, Dev</td>
</tr>
<tr>
<td>General Availability</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Research Phase</td>
<td>1 month – 5+ years</td>
<td>Business case approval</td>
<td></td>
</tr>
</tbody>
</table>
Product Management

• NOT the source of all ideas
• Responsible for pulling together desperate sources of information & collating into a roadmap
  – Often has P&L Responsibility for a product
• Differs from Marketing
  – Product Marketing Manager TALKS
  – Product Manager LISTENS
Research Methods

• Customer Visits
• Surveys
• Competitive Analysis
• Customer Feedback
• Support Requests
• Analyst Reports
• Partner Customer Research Reports
• Corporate Annual Statements
• Win/Loss Analysis
• Any other way of getting data on the market!
ANTS PROFILER V4
## Win/Loss Analysis

<table>
<thead>
<tr>
<th>Win</th>
<th>Loss (Bought competitor)</th>
<th>Loss (No Purchase)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ease of use</td>
<td>Speed</td>
<td>Trial solved my problem</td>
</tr>
<tr>
<td>Price</td>
<td>Ease of use</td>
<td>No native code support</td>
</tr>
<tr>
<td>Good support</td>
<td>Price</td>
<td>Too expensive</td>
</tr>
<tr>
<td>Used it at a previous job</td>
<td>Used it at a previous job</td>
<td>Looking to purchase soon</td>
</tr>
<tr>
<td></td>
<td>Supported platform X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Could not get it to work</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Has Attach to Process</td>
<td></td>
</tr>
</tbody>
</table>

\[n=20\quad n=15\quad n=45\]
Competitive Positioning

Products

Price

Functionality

Microsoft

AQTime

dotTrace

ANTS Profiler

YourKit

SciTech

SciTech
Competitive Positioning

- Competitive Positioning
- Price
- Functionality
- Products
  - dotTrace
  - Microsoft
  - AQTime
  - SciTech
  - YourKit
  - ANTS Profiler

Diagram: Competitive Positioning matrix with products placed according to their price and functionality.
Competitive Positioning

- **Price**
- **Functionality**

Products:
- dotTrace
- Microsoft
- AQTime
- ANTS Profiler
- YourKit
- SciTech
Surveys

• Use to check your Hypothesis
• Cheap
• Hard to be statistically significant
  – We normally try to get 300-500 responses
ANTS Profiler v4: Key Findings

- Speed of Performance Profiler
- Attach to existing process so the user can look at part of a run
- Memory profiler could not deal with large amounts of data
- Memory Profiler overhead was too large
- Some customers preferred the competitors GUI
The Business Case

• Clear idea of what we wanted to achieve
• Is it worth doing it?
  – Need Revenue Projections
  – Need Cost Projections
Modelling the Business

• Projecting Revenue directly is tricky and error prone

• Build a simple model of the business
  – Keep it simple
  – Use numbers you can have some control over
Modelling the Business

- Downloads: Number of people trying out the tool
- Conversion Ratio: The percentage of these people who purchase the tool
- Average Transaction Value: The average spend of a customer

\[
\text{Revenue} = \text{Conversion Ratio} \times \text{Downloads} \times \text{Average Transaction Value}
\]

\[
\text{Average Transaction Value} \propto \text{Price}
\]
Modelling the Business

• *Use simple cost models unless something more sophisticated is needed*

\[
\text{Monthly Project Cost} = \text{Number of People} \times 23 \times \$1,000
\]

\[
\text{Cost of Project} = \text{Monthly Project Cost} \times \text{Number of Project Months}
\]
Return on Investment

- Given identical risk profiles and the following projection of cash flow should we invest Project A, Project B or neither of them?

<table>
<thead>
<tr>
<th>Year</th>
<th>Project A</th>
<th>Project B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(3,000,000)</td>
<td>(3,000,000)</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>1,000,000</td>
</tr>
<tr>
<td>3</td>
<td>500,000</td>
<td>1,000,000</td>
</tr>
<tr>
<td>4</td>
<td>1,000,000</td>
<td>1,000,000</td>
</tr>
<tr>
<td>5</td>
<td>1,500,000</td>
<td>1,000,000</td>
</tr>
<tr>
<td>6</td>
<td>2,000,000</td>
<td>1,000,000</td>
</tr>
</tbody>
</table>
Future Value

- If you have £100 today how much is that worth in 2 years time?

\[
Future\ Value = Present\ Value \times (1 + i)^t
\]

\(i\) = Interest rate

\(t\) = Number of time periods (years)

\[
Future\ Value = 100 \times (1 + 0.05)^2 = 110.25
\]
Discount Cash Flow/Net Present Value

• I will offer you a contract whereby I will pay you £100 in two years time. How much is that contract worth today?

\[
\text{Discounted Present Value} = \text{Future Value} \times (1 - d)^t
\]

where \( d = \frac{i}{1 + i} \)

\[
\text{Discounted Present Value} = 100 \times \left(1 - \left(\frac{0.05}{1 + 0.05}\right)^2\right) = 90.70
\]
Discount Cash Flow/Net Present Value

• For a cash flow:

\[
Net\ Present\ Value = \sum_{t=1}^{N} \frac{C_t}{(1+i)^t}
\]

<table>
<thead>
<tr>
<th>$i$</th>
<th>Project A</th>
<th>Project B</th>
</tr>
</thead>
<tbody>
<tr>
<td>5%</td>
<td>1,065,198</td>
<td>1,266,168</td>
</tr>
<tr>
<td>10%</td>
<td>391,728</td>
<td>718,897</td>
</tr>
</tbody>
</table>
Internal Rate of Return

• For a cash flow:

$$Net\ Present\ Value = \sum_{t=1}^{N} \frac{C_t}{(1+i)^t}$$

• If we have costs and expected return then set $NPV = 0$ and solve for $i$

$$IRR(i) = -3,000,000 + \frac{1,000,000}{(1+i)^1} + \frac{1,000,000}{(1+i)^2} + \frac{1,000,000}{(1+i)^3} + \frac{1,000,000}{(1+i)^4} + \frac{1,000,000}{(1+i)^5} = 0$$
Internal Rate of Return

- Secants Method:

\[ r_{n+1} = r_n - \frac{r_n - r_{n-1}}{IRR(r_n) - IRR(r_{n-1})} \cdot IRR(r_n) \]

- Approximate \( r_0 \) and \( r_1 \) then repeat until solution converges

<table>
<thead>
<tr>
<th>Iteration</th>
<th>r0</th>
<th>r1</th>
<th>r2</th>
<th>r3</th>
<th>r4</th>
<th>r5</th>
<th>r6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project B</td>
<td>25.00%</td>
<td>35.00%</td>
<td>18.38%</td>
<td>20.28%</td>
<td>19.87%</td>
<td>19.86%</td>
<td>19.86%</td>
</tr>
</tbody>
</table>
Pitfalls with NPV, DCF and IRR

- Negative NPV projects might still be worth doing
- NPV calculations compound discount rates
  - Do not adjust for risk
- DO NOT discount known future costs
- NPV is an absolute number
  - Represents accretive value to shareholders
- IRR is expected return on capital
  - Does not include the cost of capital itself
Dealing with Uncertainty

- Lots of uncertainty in model
- Use Monte-Carlo Analysis
  - Replace single valued inputs with PDFs
  - Run the model thousands of times collecting output values

- For example:
  - Project Length: $U(9,18)$
  - Accretive Conversion Ratio: $N(0.05, 0.03)$
  - Additional Number of Leads: $U(1000,5000)$
Sensitivity Analysis

• What is the effect of each assumption?
• Use Monte-Carlo Analysis
  – Replace single valued inputs with PDFs
  – Run the model thousands of times, but only vary a single pdf, collecting output values
• Tornado chart:
USABILITY
The iPod

Bill Buxton, Sketching User Experiences, p48, 2007
Improving Ease of Use

- Had idea of how to solve speed issue
- Wanted to make sure we kept all of our options open
Improving Ease of Use
Improving Ease of Use
Improving Ease of Use
Improving Ease of Use
Improving Ease of Use
Improving Ease of Use

<table>
<thead>
<tr>
<th>Time with Child (%)</th>
<th>Namespace</th>
<th>Type</th>
<th>Method (Tree View)</th>
</tr>
</thead>
<tbody>
<tr>
<td>73.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>72.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>72.3%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>37.5%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36.0%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36.0%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.75%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.75%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36.2%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>38.1%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.0%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Improving Ease of Use
Improving Ease of Use
Improving Ease of Use
Improving Ease of Use
Running Usability Sessions

• Easy to do!
• Keep it cheap
• Explain the aims of the session to the user:
  – You are testing the software NOT the user
  – Don’t always answer their questions
    • Real users don’t have an expert sat next to them
• If they struggle for too long help them out with the specific issue
• If you know there is a problem help them sooner
• Remote sessions are fine
ANY QUESTIONS?